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Pileus membranaceous, tough, sessile, reniform or subflabellate, yellow-brown, subrugulose, the margin entire or incised. Lamellae radiating behind, rather broad, few, branched, reticulate, anastomosing, pallid.

Growing on trunks covered with mosses; Hawaia. Pileus 1-3 cm. broad, 1.5-2 cm. long.

UREDINEOUS CULTURE EXPERIMENTS WITH PUCINIA SORGHI, 1905.¹

W. A. KELLERMAN.

For three seasons previous, reports of infection experiments have been made dealing with quite a number of Rust species. This fourth report is, unfortunately, extremely brief; due to the fact that a Winter mycological collecting trip was made to Guatemala that lasted into Spring. Also other work that had been in the meantime neglected, demanded much time and, besides, class duties in college were pressing. Consequently nothing was carried to completion this season except the Maize Rust experiments which can be outlined in a few sentences.

First let me recur to the completed work with this species one year ago. At that time I secured what was taken to be infection of Maize plants direct with teleutospores (but below will be differently interpreted); and thereafter extended inoculation work was carried on with the uredospores so secured.

SUMMARY OF PREVIOUS WORK.

No inoculations with Maize Rust were on record previous to 1904. Work for that season was published in the *Journal of Mycology*, 11:26-33, Jan. 1905, and the point settled beyond possible doubt were these: That, using uredospores, the species was readily transferred to any and all the "agricultural species" of Maize; that teosinte (*Euchlaena luxurians*) was also a host for this species of Rust (not before reported); that attempts to inoculate *Sorghum vulgare*, *Saccharum officinarum*, and *Triplicum dactyloides* were unfruitful.

AN AECIDIUM NOT DETECTED.

In the progress of the work no Aecidium was encountered, though spores were taken from teleutosporic pustules that had been exposed all winter (on sweet corn), and with sowings

¹ Contributions from the Botanical Laboratory of the Ohio State University, XXIII.

therefrom uredospores were obtained also later teleutospores. The pustules were cursorily examined before used and nothing was observed but teleutospores.

DR. ARTHUR'S DISCOVERY OF THE AECIDIUM.

Before my work was published Dr. Arthur had the rare good fortune to demonstrate the aecidium stage of the Maize Rust. Twice I had, as I supposed, obtained uredospores by using teleutospores direct on Maize plants—and scant material yet remaining enabled me to get a *third inoculation* with spores from my teleutosporic pustules. As far as seemed consistent with probable success in this third attempt at inoculation the pustules were disintegrated and the mass of spores (with loss of course) was subjected to microscopic scrutiny; but no uredospores were seen. Doubtless further search should have been made—uredospores *might have been found*, and that, of course, would have been of far greater value than the successful inoculation. Dr. Arthur used aecidiospores of *Oxalis* to inoculate Maize. The final link in the absolutely complete demonstration was this only—to use teleutospores of Maize rust to secure the aecidium on *Oxalis*. This I did.

WORK WITH THE TELEUTOSPORES IN 1905.

The chain of evidence was in fact complete—or at least neither Dr. Arthur nor myself longer could doubt that the life cycle of this Rust included three stages—aecidium, uredo and teleuto. Confidently therefore on my return from Guatemala I instituted experiments in the month of April and early in May, using teleutospores from sweet corn that had been exposed all winter. In due time the several *Oxalis* plants on which sowings were made responded generously and repetitions were equally satisfactory.

REPETITION OF FORMER WORK.

The theory I proposed one year ago, namely, that an aecidium might be suppressed at will (or under circumstances), I now abandon. It is very probable that *a few uredospores* viable were harbored by the teleutosporic pustules and these in that case of course gave the inoculation of the Maize. Uredosporic inoculation as shown by numerous experiments later was not difficult, but a very certain result to be anticipated whenever spores fell, or were placed, on the proper host.

SIGNIFICANCE OF THE PHENOMENA OF UREDOSPORIC INOCULATION.

The surprise that the rather rare aecidium of *Oxalis* should belong to the very common and very abundant Rust of Maize was shared by many mycologists. But the reinterpretation of my work—which does not seem irrational—clears up the mat-

ter. Doubtless then the Rust of Maize is carried over from year to year in part by means of surviving uredospores. Finally, it may be said that while this interpretation was, of course, not unthought of by uredinists, I preferred myself to record the final judgment only after further work had been carried on in my own experimental laboratory. Therefore this is the conclusion of the whole matter.

CULTURES OF UREDINEAE IN 1905.¹

BY J. C. ARTHUR.

The present article forms the sixth of a series of reports² by the author upon the culture of plant rusts. They cover the years from 1899 to the present year, inclusive. In these studies the grass and sedge rusts hold a prominent place, but other heteroecious and autoecious species have been included, and during the present season the work has been extended to the so-called *opis*, *micro* and *lepto* forms, and also to species with amphispores.

The coöperative agreement between the Bureau of Plant Industry of the U. S. Department of Agriculture and the Indiana Experiment Station, which existed for carrying on the culture work in the spring of 1904, was again established, extending from July, 1904, to April 30, 1905, making it possible to have an assistant during this period, who devoted nearly his whole time to the study of the rusts. The position was first held by Mr. J. C. Marquis, who was succeeded on October 1, 1905, by Mr. Frank D. Kern, and after the expiration of the coöperative agreement Mr. Kern was retained by the Experiment Station to continue the work. After May 10 all the work fell upon Mr. Kern until September, covering the most important part of the culture period, the author being absent in Europe. It could not, however, have been entrusted to better hands, as the fine ability displayed in the work during the previous season, coupled with considerable experience already acquired, enabled him to meet the new conditions as they arose, and the judgment and caution indispensable in securing authoritative results.

Much of the completeness of the work is due to the kindly assistance of correspondents, who have sent teleutosporic material, and especially to Messrs. E. Bethel, Denver, Colo.; J. M. Bates, Red Cloud, Neb.; A. O. Garrett, Salt Lake City, Utah;

¹ Read before the Botanical Society of America at the New Orleans meeting, January 1, 1906.

² See Bot. Gaz. 29:268-276; Jour. Mycol. 8:51-56; Bot. Gaz. 35:10-23; Jour. Mycol. 10:8-21 and 11:50-67.